SALT RIVER WATERSHED

The bulk of the Salt River watershed is within the Salt River and Tonto Creek groundwater basin boundaries. The headwaters originate within the Salt River basin and the western terminus, at its confluence with the Gila River, is within the Phoenix Active Management Area.

The Salt River drains an area of approximately 5,980 square miles and is the largest tributary of the Gila River (U.S. Army Corps of Engineers, 1982). The headwaters of the Salt River are the White and Black Rivers which originate at elevations near 11,400 feet above mean sea level in the White Mountains. From the confluence of the White and Black Rivers, the Salt River roughly follows a 140-mile course southwesterly to its confluence with the Gila River at an elevation of about 900 feet above mean sea level.

STREAMFLOW CHARACTERISTICS

The Salt River is perennial from its headwaters to Granite Reef Diversion Dam near Mesa. The Black and White Rivers originate on the Fort Apache Indian Reservation in the White Mountains and together drain a total of nearly 1,900 square miles.

Numerous streams that start as springs and seeps along the Mogollon Rim and in the White Mountains feed the tributaries of the Salt River. The perennial flows in these areas are primarily a result of geologic barriers discharging groundwater to streams. Volcanic rocks are exposed along the east-central portion of the state in the Central highlands. Water is forced through this volcanic material through joints and fractures and discharges as springs where these fractures intersect the ground surface. Table 1 lists selected perennial streams tributary to the Salt River throughout the watershed. The location of these streams are displayed on Figure 4.

TABLE 1
SELECTED PERENNIAL STREAM REACHES IN THE SALT RIVER WATERSHED

Perennial Stream Reaches	Length (miles)
East Fork Black River	19
West Fork Black River	16
Beaver Creek	8
Reservation Creek	15
Black River	76
Little Bonito Creek	16
Big Bonito Creek	26
Tonto Creek	18
North Fork White River	46
Diamond Creek	19
East Fork White River	26
White River	16
Carrizo Creek	25
Corduroy Creek	13

Cibecue Creek	36
Salt River Draw	6
Canyon Creek	46
Cherry Creek (3 reaches)	29
Salome Creek	12
Greenback Creek	5
Rye Creek	2
Spring Creek	9
Haigler Creek	13
Tonto Creek (2 reaches)	46
Pinal Creek	4
Source: Brown and others, 1981	

Fifteen streamgaging stations have been operated by the U.S. Geological Survey in the Salt River watershed (Figure 5). Annual flows for these gaging stations are presented in Table 2.

RESERVOIRS

Water from the Salt River watershed is impounded by a series of four dams on the Salt River operated by the Salt River Project. The water is used by the metropolitan Phoenix area for municipal, industrial, and agricultural purposes. Present storage capacities of these reservoirs are as follows:
Reservoir Storage Capacity (acre-feet)

- Roosevelt -- 1,336,700
- Apache -- 245,100
- Canyon -- 57,900
- Saguaro -- 69,800

Source: Salt River Project, 1984; U.S. Bureau of Reclamation, 1982
Combined pan evaporation data for all the Salt River Project reservoirs were averaged for the years 1954-1985 and then apportioned by each reservoirs' relative surface area to obtain the average pan evaporation for each reservoir. Relative surface area and average evaporation are summarized in Table 3.

TABLE 2
ANNUAL FLOWS FOR USGS STREAMGAGING STATIONS IN THE SALT RIVER WATERSHED

Station Name	Station Number	Period of Record	Mean Annual Flow (ac-ft)	Median Annual Flow (ac-ft)	Record Annual High Flow (ac-ft)	Record Annual Low Flow (ac-ft)
East Fork White River near Fort Apache	9492400	1958-1990	26,150	27,430	52,190	10,710

White River near Fort Apache	9494000	1958-1990	148,850	147,290	351,770	39,010
Black River near Fort Apache	9490500	1915 1958-1990	302,640	262,740	868,560	56,460
Black River near Maverick	9489100	1963-1982	102,030	71,220	283,730	26,780
North Fork White River near McNary	9491000	1945-1985	35,295	33,010	78,170	11,580
Carrizo Creek near Show Low	9496500	1952-1960 1968-1975, 1978-1990	38,090	20,880	145,480	4,205
Salt River near Chrysotile	9497500	1925-1990	471,680	378,190	1,457,730	133,900
Cibique Creek near Chrysotile	9497800	1960-1990	32,570	23,450	96,260	11,580
Salt River near Roosevelt	9498500	1914-1990	642,730	511,000	2,352,350	170,820
Cherry Creek near Globe	9497980	1966-1978 1980-1990	25,330	14,800	94,090	4,780
Tonto Creek above Gun Creek near Roosevelt	9499000	1942-1990	109,290	66,590	430,660	13,750
Salt River below Stewart Mountain Dam	9502000	1935-1990	707,150	576,870	2,555,010	203,390
Tonto Creek near Roosevelt	9499500	1914-1940	108,060	91,920	267,810	13,030
Black River below power plant near Point of Pines	9489500	1954-1990	151,270	124,490	440,070	35,470
Forestdale Creek Division from Show Low Creek	9495000	1954-1990	3,550	3,660	9,410	0

Source: U.S. Geological Survey, 1992, National Water Information System

TABLE 3
ANNUAL EVAPORATION OF THE SALT RIVER LAKES

Lake	Relative Surface Area	Avg. Evaporation (acre-feet)
Roosevelt	62.2%	68,700
Apache	9.5%	12,400

Canyon	3.4%	3,700
Saguaro	4.7%	5,400

Source: Salt River Project, 1987

In recent years, the Federal Safety of Dams program identified a need for modifications on some of the Salt River Project dams. These modifications will provide needed safety, flood control and conservation storage upon completion. Modification plans include:

- Enlarging Roosevelt Dam to provide flood control and to safely handle the probable maximum flood on the Salt River watershed. The probable maximum flood is defined as the maximum runoff that would result from the most severe combination of hydrologic and meteorologic conditions that are considered reasonably possible for a particular drainage basin (Salt River Project, written commun., 1993).

- Improvements to Stewart Mountain Dam on the Salt River that improve flood handling capabilities and protect the dam from the maximum credible earthquake. The maximum credible earthquake is broadly defined as the largest earthquake that could occur at a given location under the currently known tectonic framework. Modifications at Stewart Mountain Dam have been completed.

Modifications to Roosevelt Dam began in 1991 and include increasing the dam height by 77 feet. This could increase the reservoir storage capacity by at least 2.1 million acre-feet at its maximum level. However, most of this new space will be left vacant to provide flood storage and surcharge capacity for passing the probable maximum flood. After dam completion, the water level in Roosevelt Lake could reach an elevation of 2,151 feet, or 15 feet higher than its present maximum water surface elevation (Salt River Project, 1984). Conservation storage capacity would then increase by 255,100 acre-feet from 1,336,700 acre-feet to a projected total of 1,591,800 acre-feet. The modifications also created 17,400 acre-feet of dead storage space.

WATER QUALITY

Turbidity problems exist along many of the stream reaches in this watershed. The sources of the turbidity are related to rangeland management, recreation, mining, sand and gravel operations, naturally occuring and other unknown sources (Arizona Department of Environmental Quality, 1990).

Occurrences of high levels of fecal coliform bacteria and ammonia have been reported for Carrizo Creek and the White River (Arizona Department of Environmental Quality, 1990).

Pinal Creek, Miami Wash and Bloody Tanks Wash are reported to have metals, turbidity, and low pH violations and total dissolved solids concentrations over 3,000 milligrams per liter (Arizona Department of Environmental Quality, 1990). These exceedances are attributed to the mining operations in the area. Because the Globe-Miami area is highly mineralized, it is possible that contamination could naturally occur when water came into contact with native deposits. However, sampling of ground and surface water in the area revealed no natural background levels of metals and revealed contaminant solutions beyond the limits consistent with natural sources (Central Arizona Association of Governments, 1983).